

Algebra 2 Final Exam PRACTICE TEST
2016 – 2017

Name: Ms. Raskin

By signing below, I verify that this work is my own. I have neither given nor received help. I have completed my work within the expectations of the *Washington Latin School* Code of Conduct.

Signature: _____

Date: _____

Part I: Parent Functions

The parent functions for **linear** and **exponential** functions we have studied this year are listed below.

Linear Function:

$$y = mx + b$$

Exponential Function: $y = ab^x$

1) What letter in the **linear** function represents the **rate of change**? (1pt) m

2) What letter in the **exponential** function represents the **rate of change**? (1pt) b

3) What letter in the **linear** function represents the **initial value**? (1pt) b

4) What letter in the **exponential** function represents the **initial value**? (1pt) a

5) A **linear** function changes by adding a number each time. An

exponential function changes by multiplying a number each time. (1pt each)

Formulas for a **quadratic function** are below:

Quadratic Function: **Vertex Form:** $y = a(x - h)^2 + k$

Factored Form: $y = a(x - r_1)(x - r_2)$

Standard Form: $y = ax^2 + bx + c$

6) What letter shows the **rate of change** in all of the forms? (1pt)

a

7) Which form tells you where the **vertex** is? (1pt)

vertex form

Copy that form here, and show where the vertex is. (2pts)

$$y = a(x - h)^2 + k$$

vertex

8) Which form tells you where the **roots/x-intercepts** are? (1pt)

factored form

Copy that form here, and show where the roots are. (2pts)

$$y = a(x - r_1)(x - r_2)$$

roots

9) What is the formula for finding the vertex in **standard form**? (2pts)

$$x = \frac{-b}{2a}$$

10) What is the **parent pattern** for change in a **quadratic function**? (2pts)

+1, +3, +5, +7

Increasing or Decreasing? and What Kind of Function?

11) Is each function **increasing** or **decreasing**? (With exponential functions, we often called this "growth" or "decay".) (2pts each)

a) $a(x) = 4x - 2$

increasing

b) $f(x) = 4(2.2)^x$

increasing

c) $m(x) = 6x^2 - 7x + 4$

increasing

Determine if each word problem below describes a **linear**, **exponential**, or **quadratic** function. You do not have to write the equation of the function. (3pts each)

- a) Mr. Hotchkiss is having a picnic, and the ants want to join him. At the first minute, 1 ant sees the food and walks over. The next minute 4 ants walk over; then 4 ants; then 8 ants.

Is this **linear**, **exponential**, or **quadratic**?

exponential

How do you know?

You multiply.

- b) Makayla is braiding Kayla B's hair for her first video shoot. She braids 2 braids every 90 seconds.

Is this **linear**, **exponential**, or **quadratic**?

linear

How do you know?

You add the same amount.

- c) Ms. Jost's plans are growing quickly. The first day they grow 2 inches. The next day they grow 3 inches. The day after that, they grow 6 inches. The following day they grow 11 inches.

Is this **linear**, **exponential**, or **quadratic**?

quadratic

How do you know?

+1, +3, +5, ...

Graphing

Graph the following functions. Use the input-output table to help.

13) Equation: $f(x) = 3(2)^x$

Circle one:

linear

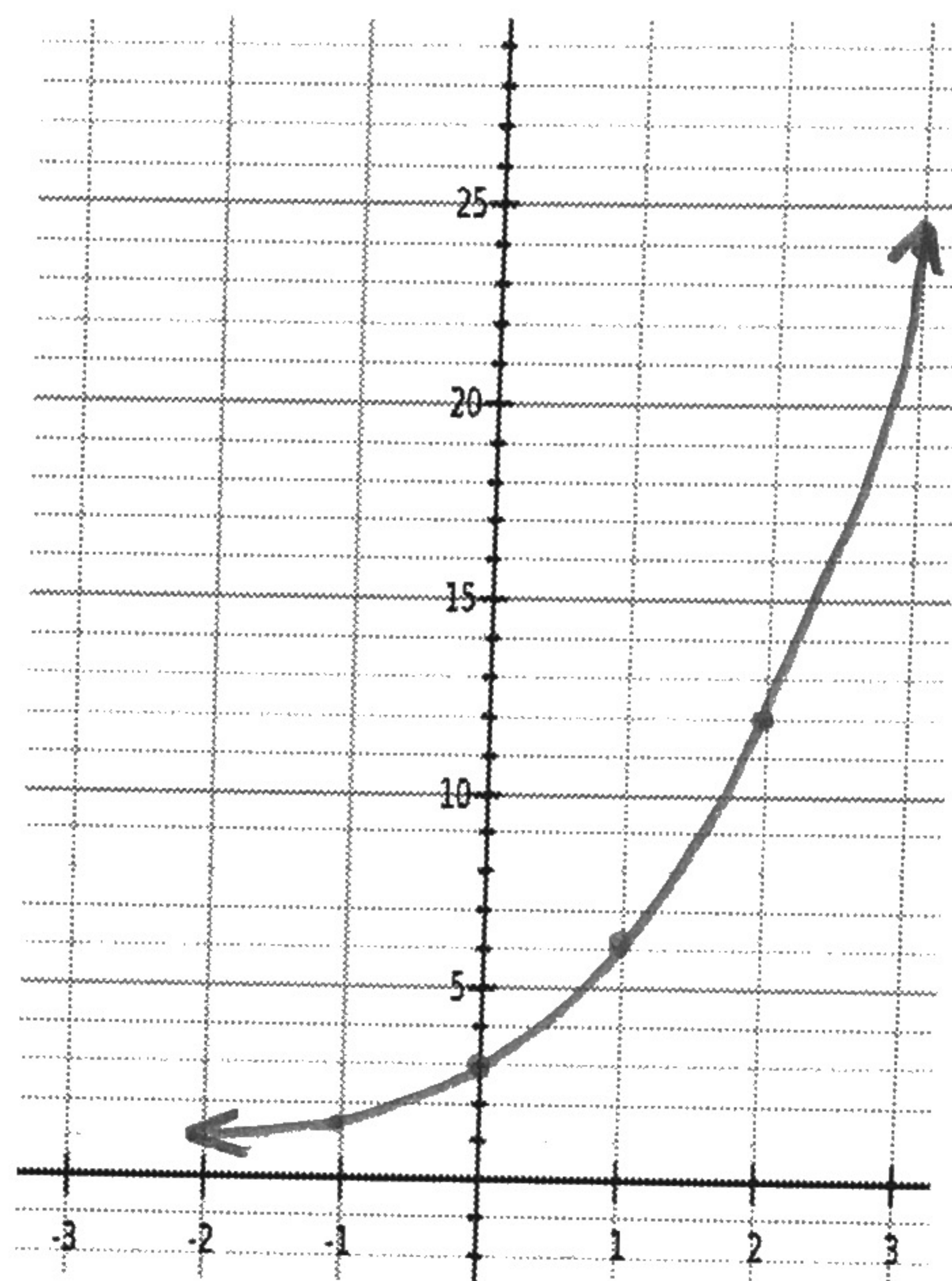
exponential

quadratic

How do you know? (3pts)

Input-Output table (2pts)

x	f(x)
-3	.375
-2	.75
-1	1.5
0	3
1	6
2	12
3	24



(4pts)

14) Equation: $f(x) = -(x + 5)^2 + 4$

Circle one:

linear

exponential

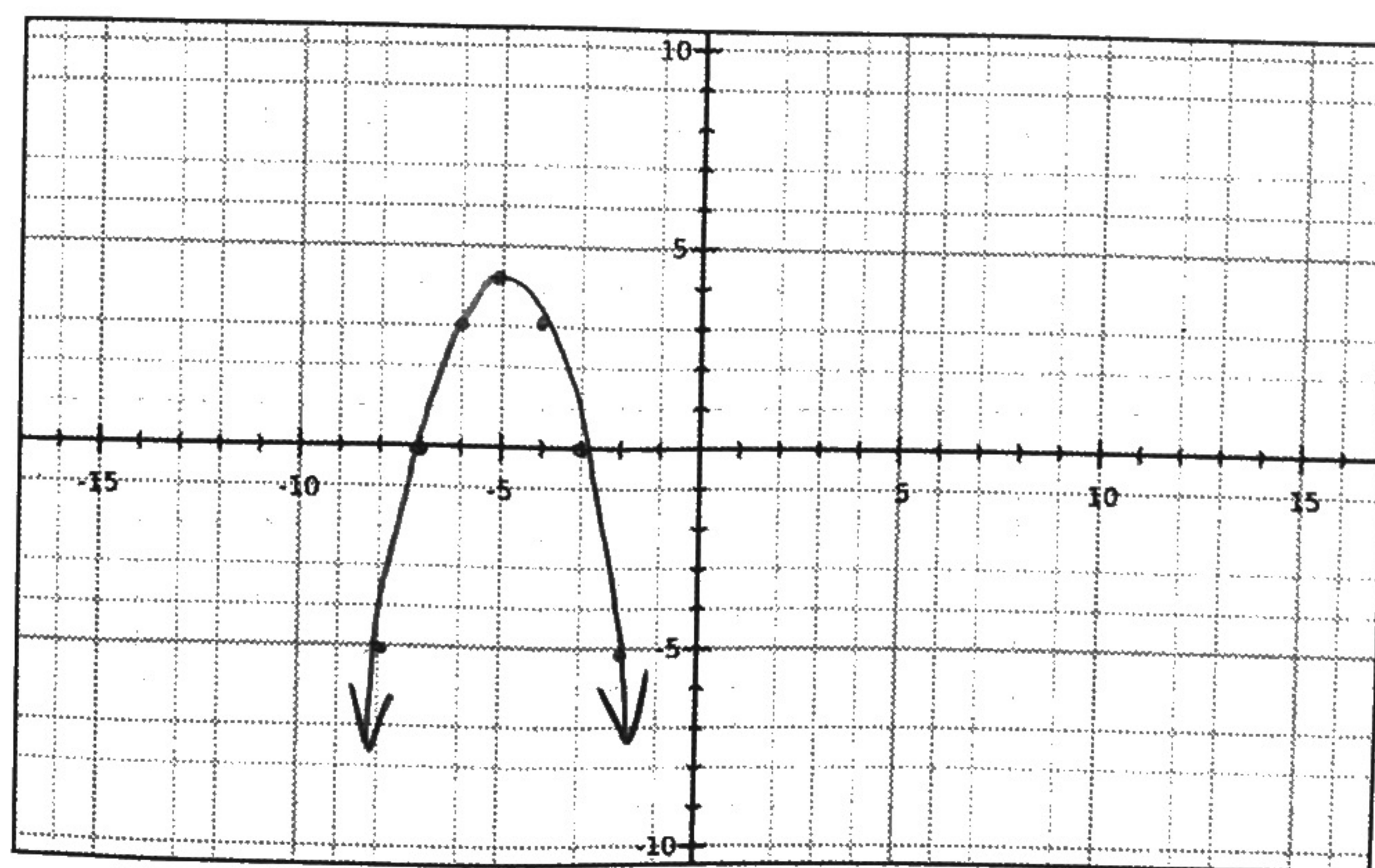
quadratic

How do you know? (3pts)

It is in vertex form.

Input-Output table (2pts)

x	f(x)
-3	0
-2	-5
-1	
0	
1	
2	
3	



(4pts)

15) Equation: $g(x) = -\frac{1}{2}(x-4)(x+2)$

Circle one:

linear

exponential

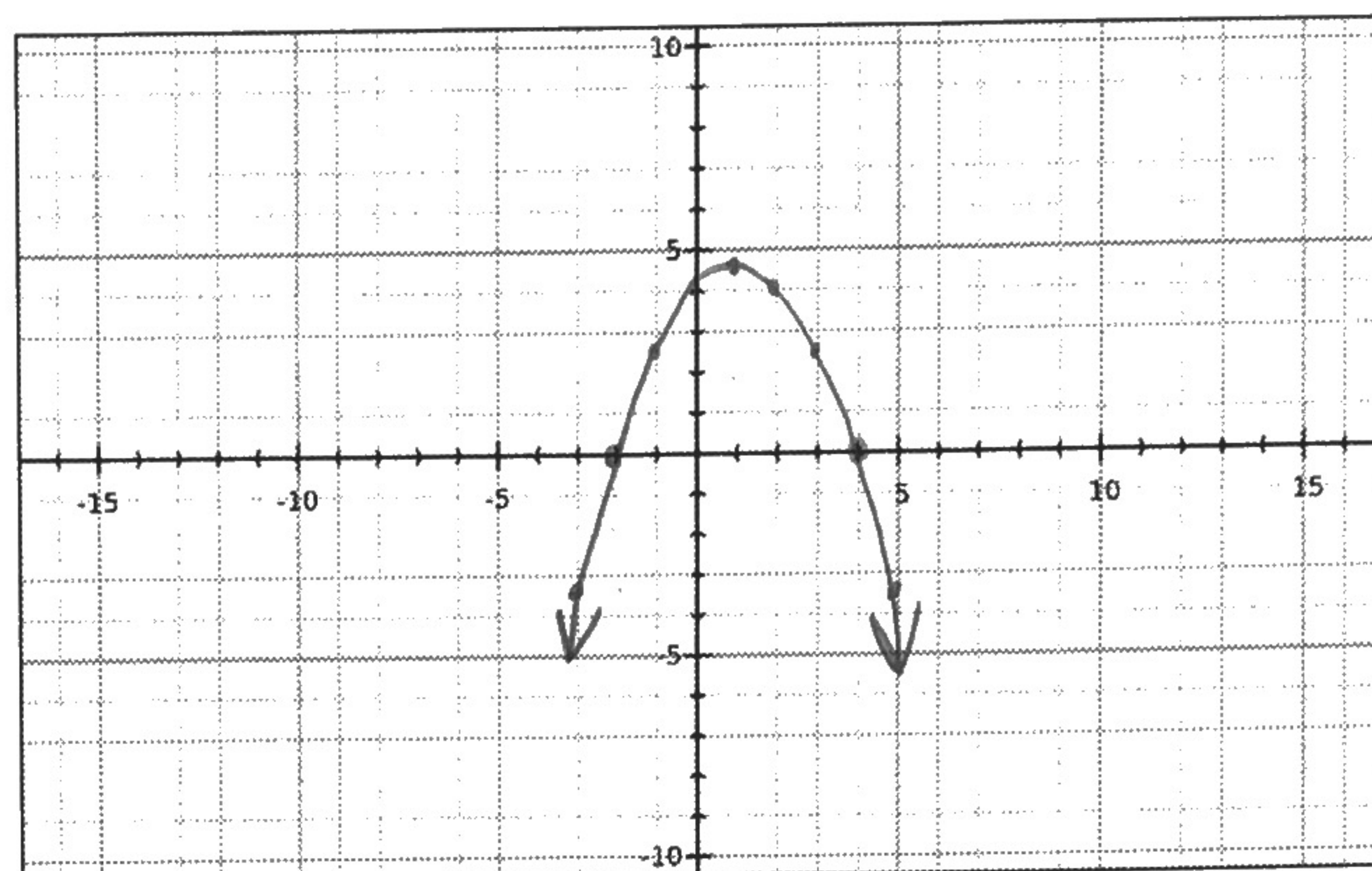
quadratic

How do you know? (3pts)

It is in factored form.

Input-Output table (2pts)

x	f(x)
-3	
-2	
-1	
0	
1	
2	
3	



(4pts)

16) Equation: $h(x) = x^2 + 6x + 8$

Circle one:

linear

exponential

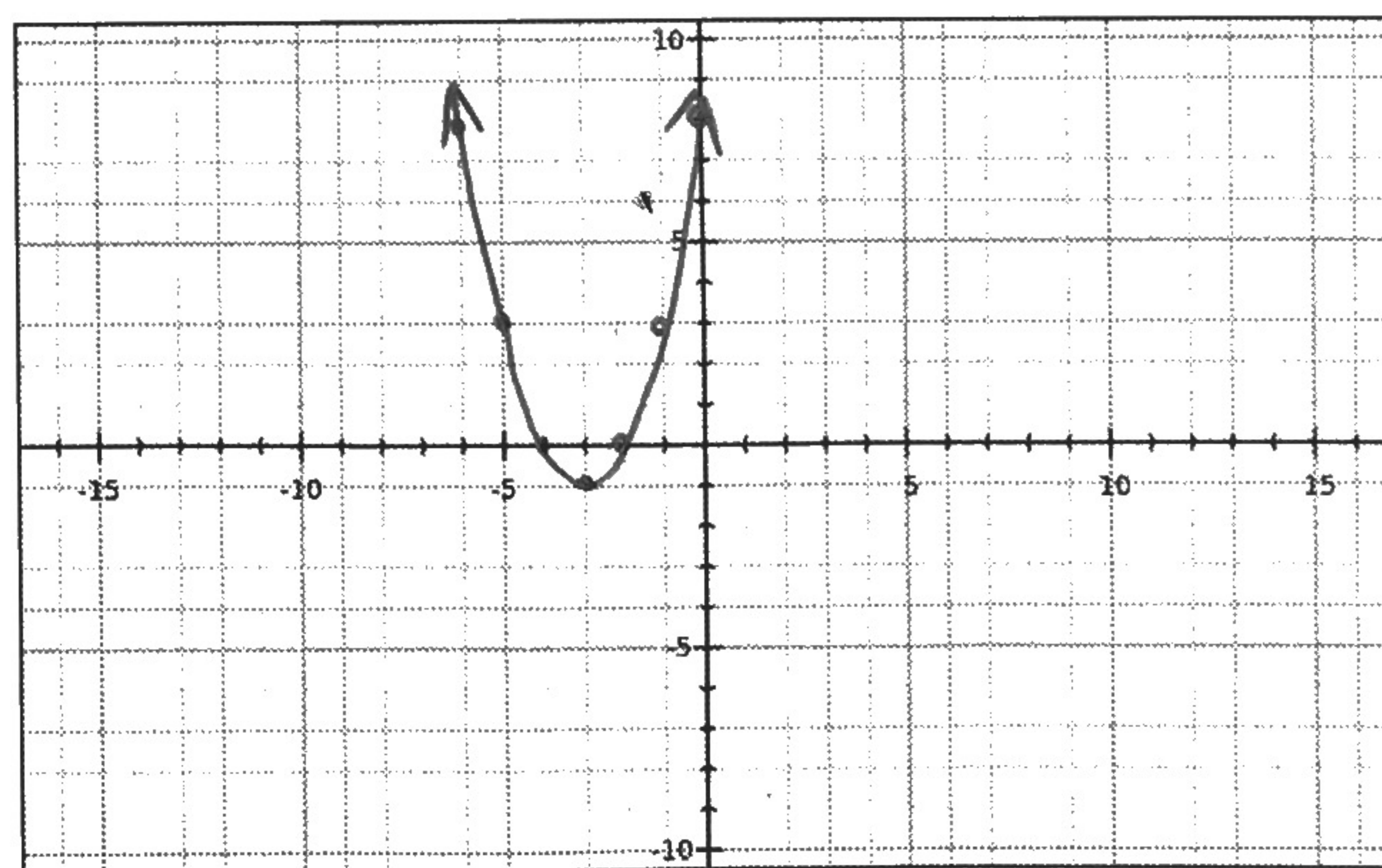
quadratic

How do you know? (3pts)

It is in standard form.

Input-Output table (2pts)

x	f(x)
-3	
-2	
-1	
0	
1	
2	
3	



(4pts)

$$x = \frac{-6}{2(1)}$$

$$x = -3$$

$$y = -1$$

Writing Equations from Graphs

17)

Circle one:

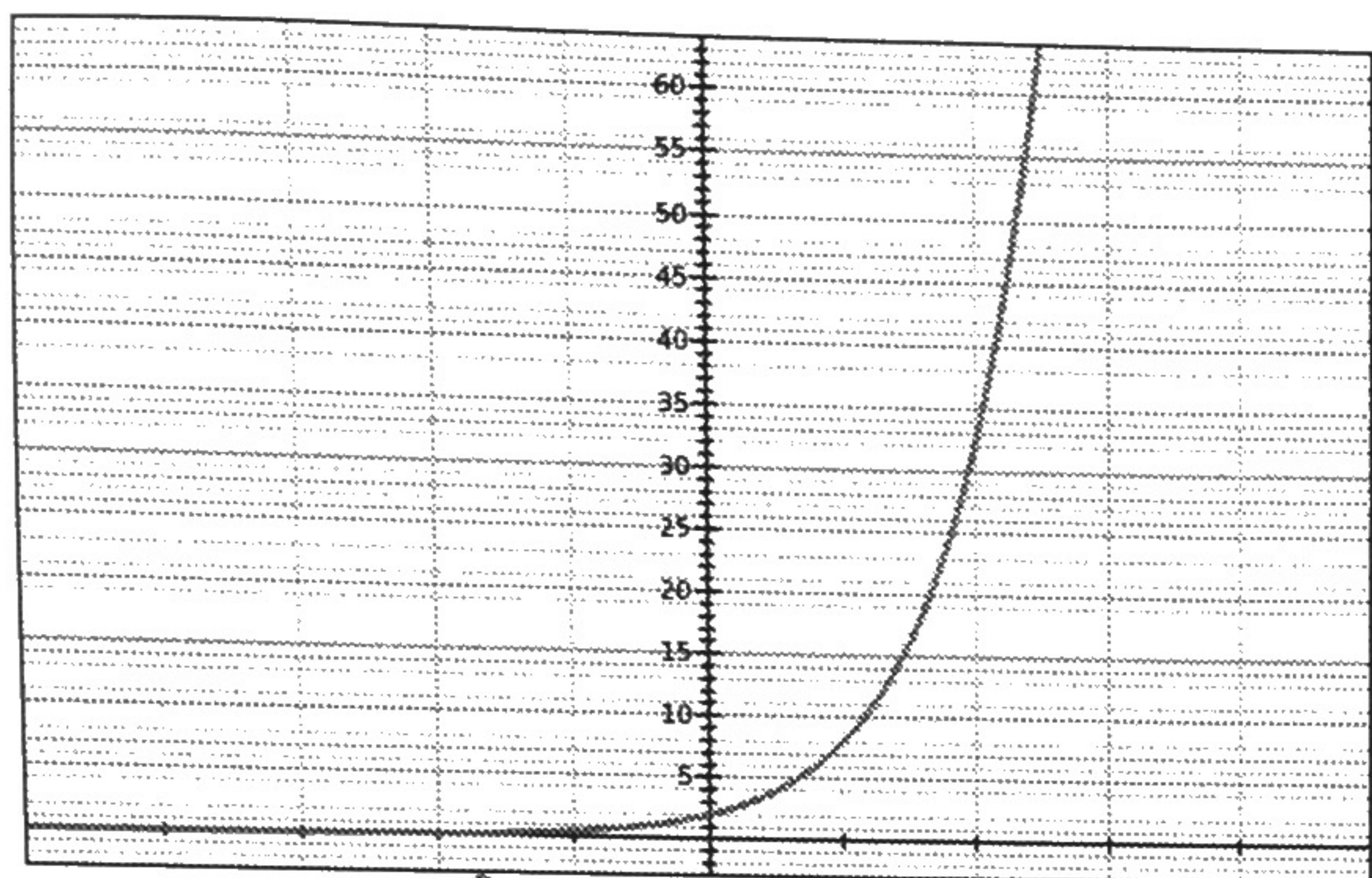
linear

exponential

quadratic

How do you know? (3pts)

It is a curve.



Initial value:

2 (2pts)

Growth rate:

3 (2pts)

Equation:

$y = 2(3)^x$ (3pts)

18)

Circle one:

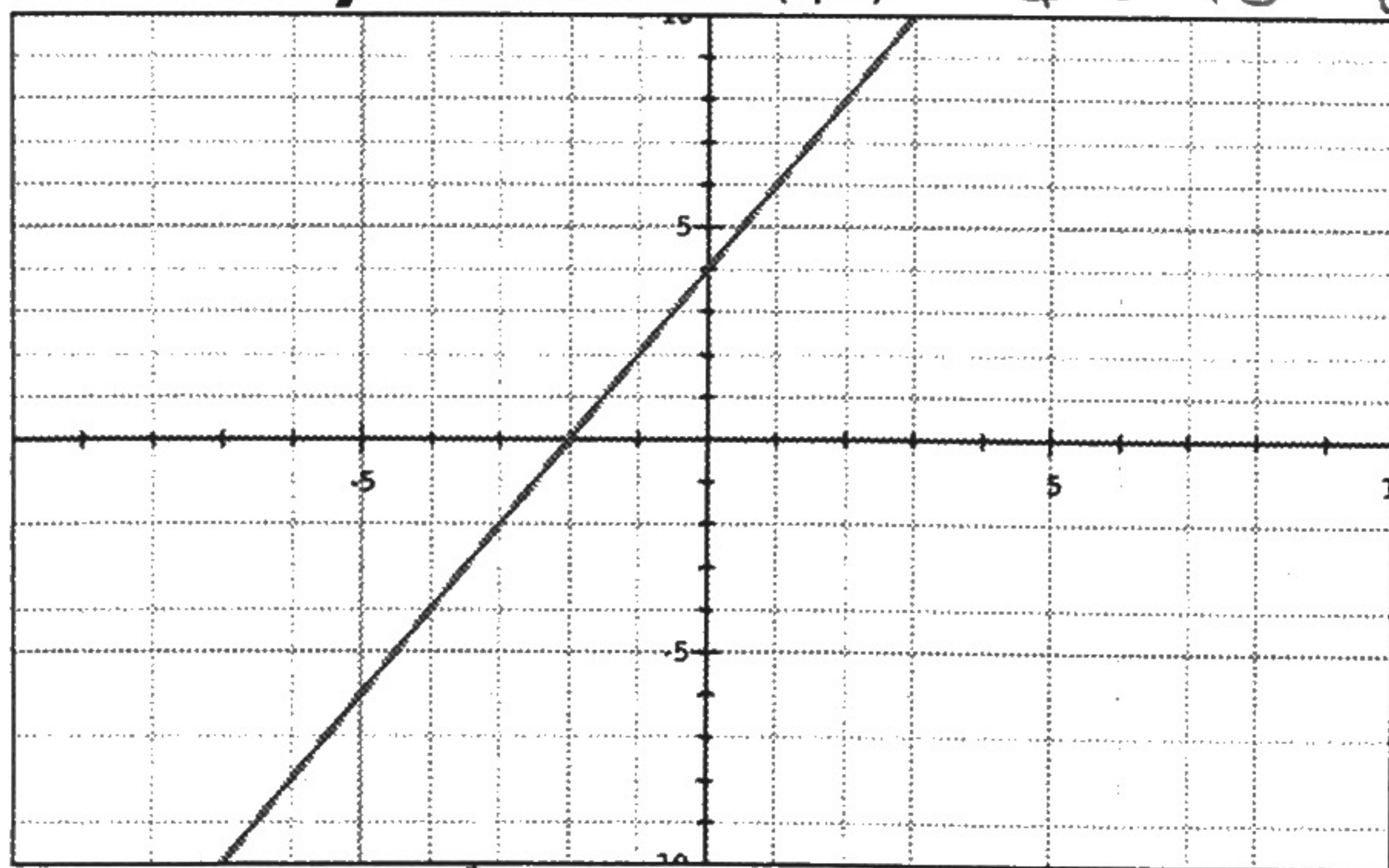
linear

exponential

quadratic

How do you know? (3pts)

It is a line.



Initial value:

4 (2pts)

Growth rate:

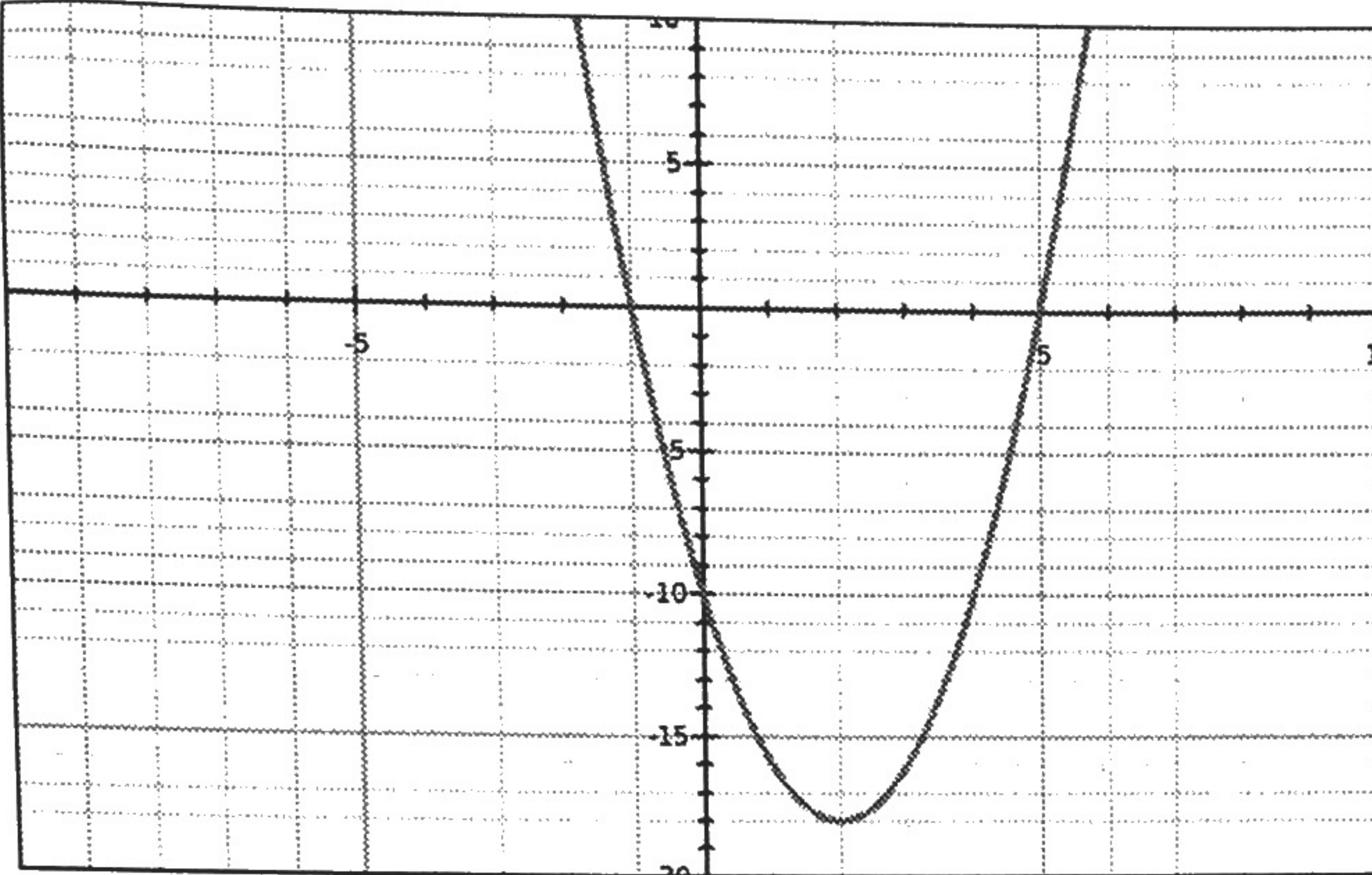
2 (2pts)

Equation:

$y = 2x + 4$ (3pts)

Write the equation in **both vertex and factored forms** shown by the following graphs of quadratic functions. (3 points each per equation)

a.



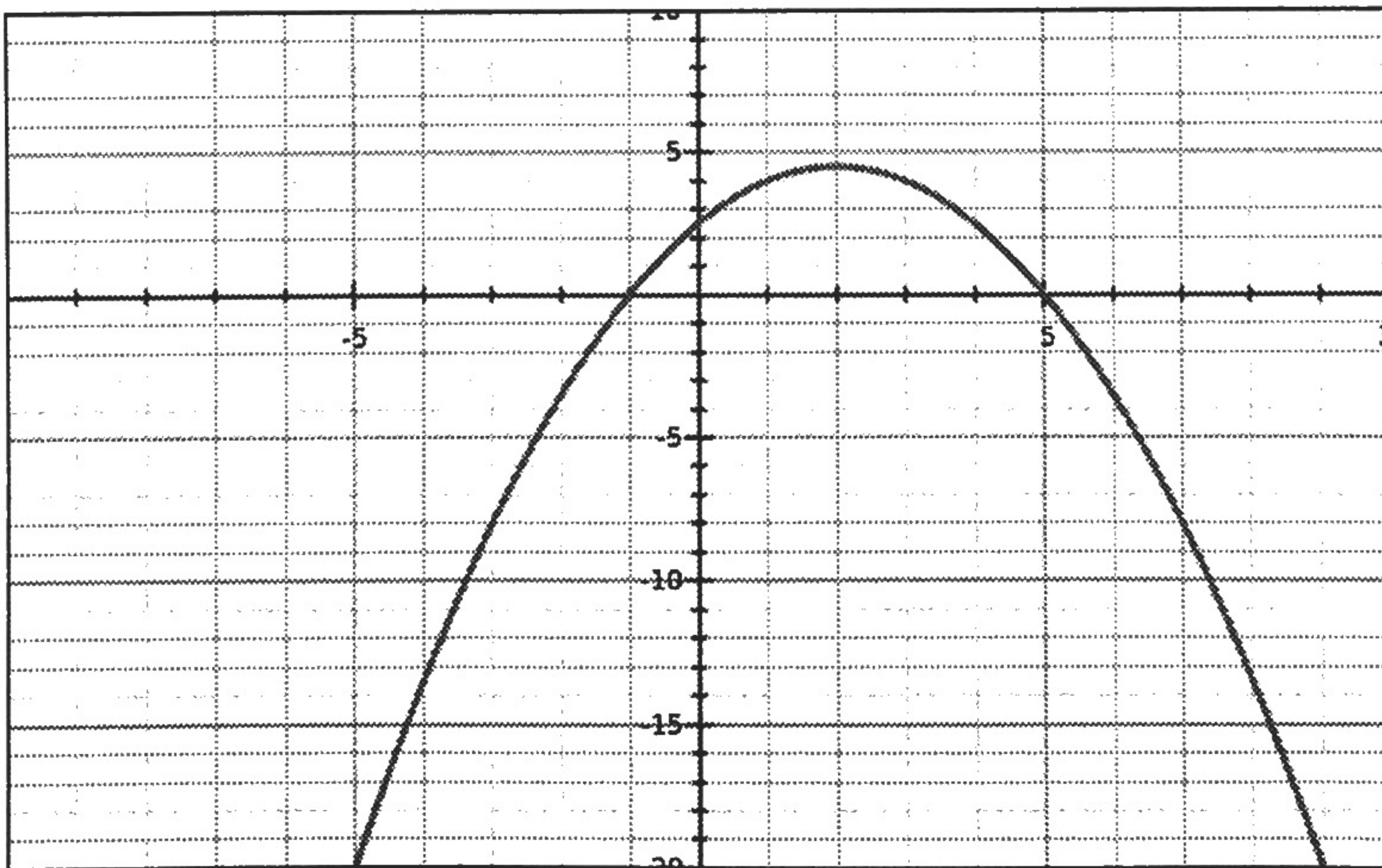
Factored Form:

$$y = 2(x - 5)(x + 1)$$

Vertex Form:

$$y = 2(x - 2)^2 - 18$$

b.



Factored Form:

$$y = -\frac{1}{2}(x - 5)(x + 1)$$

Vertex Form:

$$y = -\frac{1}{2}(x - 2)^2 + 4\frac{1}{2}$$

Writing Equations from Tables and Descriptions

20) Write the equation for each table below.

a)

x	0	1	2	3	4
y	2	8	32	128	512

Circle One:

Linear or Exponential? (2pts)

Initial value:

2 (2pts)




Growth rate:

4 (2pts)

Equation:

$y = 2(4)^x$ (4pts)

b)

Step 0	Step 1	Step 2	Step 3
 9	 6	 3	

Circle One:

Linear or Exponential? (2pts)

Initial value:

9 (2pts)

Growth rate:

-3 (2pts)

Equation:

$y = -3x + 9$ (4pts)

c) A line that passes through the points (2, 7) and (-6, 23)

Circle One:

Linear or Exponential? (2pts)

Initial value:

11 (2pts)

Growth rate:

-2 (2pts)

Equation:

$y = -2x + 11$ (4pts)

$$m = \frac{23-7}{-6-2}$$

$$m = \frac{16}{-8}$$

$$m = -2$$

$$7 = -2(2) + b$$

$$11 = b$$

Parallel & Perpendicular Lines:

Parallel lines have the same (2pts) slope and different (2pts) y-intercepts.

Perpendicular lines have opposite reciprocal (2pts) slopes.

21) Write the equation of a line that passes through the points (1, 5) and (5, 3). (3pts)

$$m = \frac{5-3}{1-5}$$

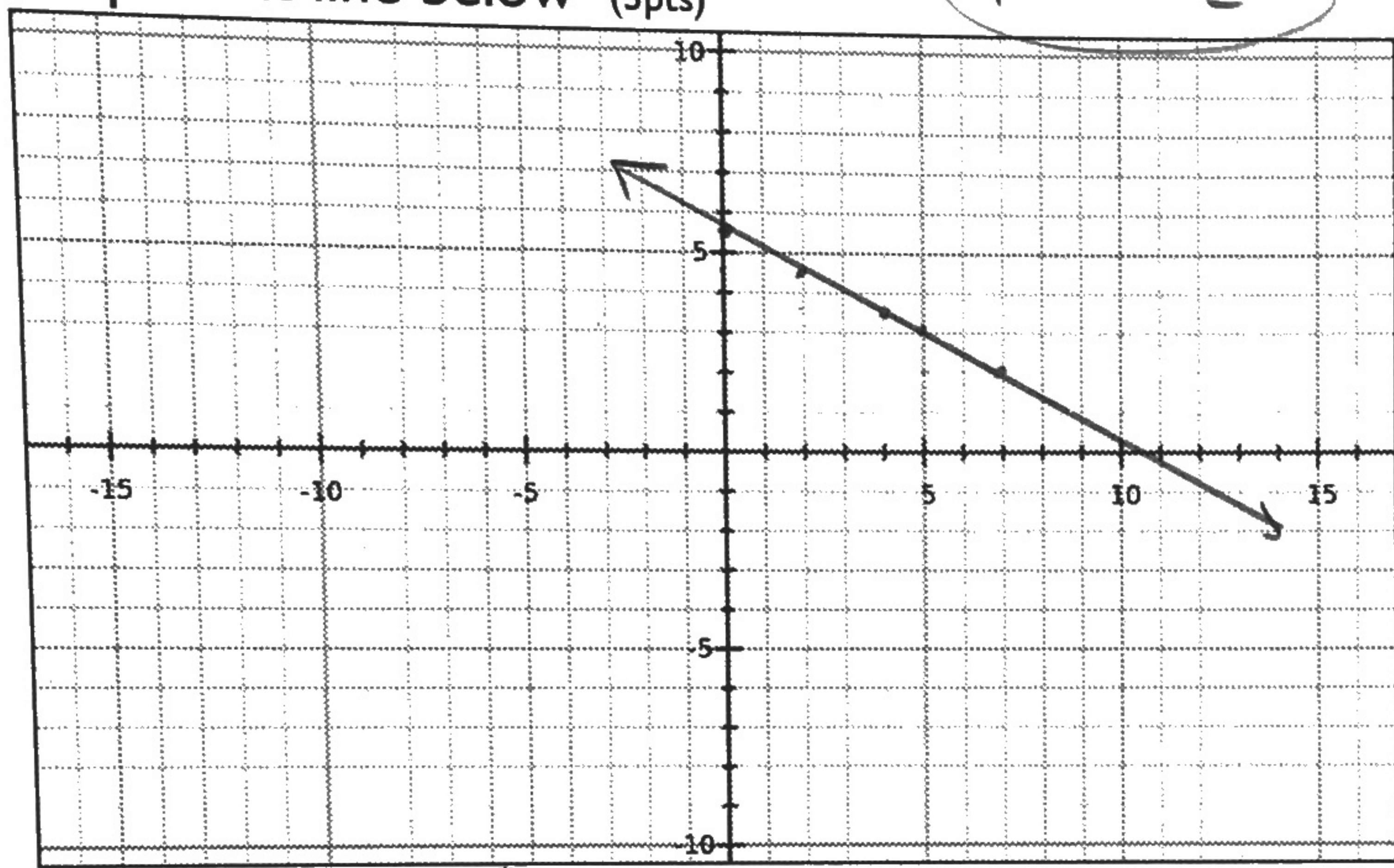
$$m = \frac{2}{-4}$$

$$5 = -\frac{1}{2}(1) + b$$

$$5\frac{1}{2} = b$$

22) Graph that line below (3pts)

$$m = -\frac{1}{2}$$



$$y = -\frac{1}{2}x + 5\frac{1}{2}$$

23) Write the equation of a line that is **parallel** to the line above and contains the point (6, 20). (3 points)

$$20 = -\frac{1}{2}(6) + b$$

$$20 = -3 + b$$

$$23 = b$$

$$y = -\frac{1}{2}x + 23$$

24) Write the equation of the line that is **perpendicular** to the line above and contains the point (12, 10). (3 points)

$$10 = 2(12) + b$$

$$10 = 24 + b$$

$$-14 = b$$

$$y = 2x - 14$$

Solving Equations (with Quadratic Functions)
Solve each of the following equations: (3 points each)

25) $0.5(x - 4)^2 - 8 = 0$

$$0.5(x - 4)^2 = 8$$

$$(x - 4)^2 = 16$$

$$x - 4 = 4$$

$$x - 4 = -4$$

$$\boxed{x = 8 \quad x = 0}$$

26) $(x - 3)(x + 7) = 0$

$$x = 3$$

$$x = -7$$

27) $x^2 - 12x - 28 = 0$

$$(x - 14)(x + 2) = 0$$

$$\boxed{x = 14 \quad x = -2}$$